



# Management control in UK innovation companies

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# Key findings

- ▶ Caution should be exercised in drawing conclusions about, and prescriptions for, 'innovation companies'. This term encompasses enterprises creatively adapting in a wide variety of ways. UK innovation companies comprise not only 'prospectors' and 'differentiators' but also enterprises in mature markets actively innovating to drive down costs by process innovations.
- ▶ While management control systems are potentially of great value their design has to be carefully considered and adjusted to fit the circumstances of each enterprise
- ▶ The overall ability of a company to innovate is very significantly associated with both types of indirect control - Personnel and Cultural. No relationship is found with direct controls.
- ▶ Managers seeking successful innovation should emphasise and invest in indirect controls – in particular Personnel Controls. Job specific recruitment and orientation programmes for new employees are very widely used and highly effective for innovation.
- ▶ The pervasive reliance on Results Controls is unsuitable for promoting innovation. None of the 5 instruments of control most effective (and 2 of the least effective) in contributing to innovation are Results Controls. The most widely used control, routine analysis of performance against budget, ranks only 13th of 22 in promoting innovation. However, Results Controls are associated with better overall performance in innovation companies.
- ▶ Furthermore, the increasingly prescribed North American practice of reinforcing Results Controls by Pay for Performance and Profit-Sharing are found to be neither much used nor as effective in promoting innovation performance as instruments of other control categories. Overall technology driven innovation companies make less use of these controls.
- ▶ The use of a budget approval process as an Action Control is widely adopted by innovation companies with a cost leadership strategy but not by 'differentiators'.

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# Abstract

The management control systems (MCS) of innovative companies is a topic of ongoing relevance, as MCS are expected to encompass a broader set of instruments in innovative settings (Davila 2000). This study builds on Merchant and Van der Stede's (2012) framework to investigate the extent of use of MCS in innovative companies. The study investigates direct forms of control, namely Results and Action Control, and indirect forms: Personnel and Cultural Control. The theoretical framework builds upon existing management control theory literature, mostly focused on R&D, product development and innovation settings, extended by field observations. Nine variables are identified as potentially influential factors for the use of MCS in innovation companies. We investigate the extent to which these innovation companies' characteristics influence the intensity of use of the four MCS categories and their impact on company success. In addition we report the relationships between the company characteristics and 22 individual control instruments.

Data from 78 UK based innovation companies were collected by online and postal surveys. We present detailed descriptive statistics on the usage of individual controls and their perceived contribution to innovation performance.

The report concludes, *inter alia*, that individual Personnel and Cultural Controls are particularly effective in these companies. Action Controls, presumably constraining employee behaviour, are only of general importance for companies with a cost leadership strategy; the use of Action Controls, as currently practised, has a negative effect on overall company success. Results Controls are intensively used in innovation companies and their overall impact on company performance seems to be positive, but some individual instruments are less effective in terms of their contribution to innovation performance.

# Introduction

The importance of innovation to economic competitiveness, to the enhancement of products and services, and to the efficiency of the business process is widely recognised. Innovative companies have been shown to have higher growth rates than others in the same industry so the promotion of innovation has become a priority for company managers and for regional and national policy makers. Numerous publications have concluded that inappropriate management control systems can hinder corporate flexibility and creativity.

However, there is insufficient large scale empirical evidence concerning the systems actually employed in contemporary innovation companies, or of the factors that influence the types of controls suitable for companies with differing characteristics. Bisbe and Malagueno (2015, p.357) for example write "There is a dearth of large-scale empirical research examining ... the implications of MACS"; likewise, Bisbe and Otley (2004, p.730) called for "... larger samples so that the stability and generalisability of the results can be improved". In addition there is a need to investigate not only categories of control systems but also individual management controls such as budgets, strategic performance measurement systems, and cost accounting (Bisbe and Malagueno, 2015).

The globalisation of trade and related cost competition make it imperative that businesses in high cost economies 'pay their way' by new products and applications, while minimising their costs by innovative processes. They also need to respond to risks associated with not innovating – as illustrated by the effect of AirBnB on the conventional hotel industry. The success of UK companies in innovating is critical to national wellbeing. At the same time, value to customers, and thus corporate value creation, is increasingly derived from the empowerment of employees and the harnessing of human capital. In this environment the importance of having appropriate managerial control systems cannot be overemphasised.

The previous literature is equivocal about the appropriateness of management control systems (MCS) to innovation companies. On the one hand, early studies in small and non-complex companies emphasised the role of informal and loose structures in order to enhance innovativeness (Burns and Stalker 1961; Lawrence and Lorsch 1967). Likewise, it has been argued (e.g. Amabile 1998; Lukka and Granlund 2003) that innovative companies struggle to balance the promotion of creativity and innovation with their need for control. On the other hand more recent research stresses the role that specific types of MCS can play, even in highly innovative companies (e.g. Bart 1993; Abernethy and Brownell 1997; Davila 2000; Cardinal 2001). Nixon (1998), Davila et al. (2009), and Kouhy et al. (2009) point to the role that specific types of MCS (especially HRM) can play even in highly innovative companies. Companies with high knowledge intensity and enhanced needs for organisational learning, find management controls useful if developed to address the needs of their professionals (Kloot 1997; Ditillo 2004; Chenhall 2005).

Bisbe and Malagueno (2015) explain that sustained innovation is a consequence of processes that have to be managed – both in respect of 'creativity' and especially in respect of 'conversion'. They also concluded that the relationship between controls and innovation performance needs to be nuanced and conditional on the 'entrepreneurial orientation' of firms; this type of conditionality elaborated on Bisbe and Otley (2004) who found that the use of MCS had a positive effect on low-innovating firms but a negative effect on high-innovating ones. Creating systems and processes which promote operational excellence whilst tolerating uncertainty, ambiguity and change so that employees grow and share their knowledge and skills, is required for a sustainable innovative culture (CGMA, 2013).

# Objectives

The application of MCS in innovative settings has been explored by various studies, but many are exploratory case studies e.g. Mouritsen, Hansen and Hansen (2009) or Mundy (2010), are dated or have limited sample size e.g. Bisbe and Otley (2004) with data from 40 companies. Other strong work, such as Adler and Chen (2011) is conceptual and sets the scene for empirical testing. Also some studies consider only single control instruments or individual control categories or only a few potentially influencing factors.

Against this brief background we aim to address three clear research questions in the contemporary UK context:

1. What are the characteristics of management control systems that are appropriate for innovation companies?
2. What individual management controls are applied in UK innovation companies in 2016/17 and what their effects on innovation performance?
3. What factors influence the types of management control systems, and specific tools, applied in innovation companies?

We concentrate not only on particular control instruments but on categories of control systems, and investigate the application of broad categories of control based on the Merchant and Van der Stede (2012) objects-of-control framework. This will respond to calls (e.g. Ferreira and Otley, 2009) for the application of a comprehensive, integrative approach.

The main objectives of the research project are as follows:

- a) To shed light on the types of management control systems that are appropriate for innovation companies,
- b) To identify individual management controls that are applied in UK innovation companies in 2016/17 and their perceived effect on innovation performance,
- c) To show factors that influence the types of management controls, and specific tools, applied in innovation companies.



# Research methodology and methods

We adopted the Merchant and Van der Stede (2012) objects-of-control framework as a coherent set of management control systems. According to this framework, four categories of MCS can be distinguished: Results, Action, Personnel and Cultural Control. An overview of these, their definition and examples of corresponding control techniques, is shown in Table 1 below.

Table 1: The objects-of-control framework (Merchant and Van der Stede 2012, and Hutzschenreuter 2009, adapted by the authors)

| Category                       | Results Control  | Action Control  | Personnel Control  | Cultural Control   |
|--------------------------------|--|---|--|--|
| Mode of control                | direct   | direct  | indirect   | indirect   |
| Definition                     | enforce target achievement through <b>monitoring</b> and <b>rewarding outputs</b>  | prevention of undesired behaviour, promotion of desired behaviour for <b>task accomplishment</b>  | fulfilment of <b>job requirements</b>  | control through establishment of <b>shared values</b> , social norms and beliefs   |
| Notion of control              | control of <b>outputs</b> through management   | control of <b>behaviour</b> through management  | exercise of <b>self-control</b> by individual employees  | <b>group control</b> among organisational members  |
| Examples of control techniques | <ul style="list-style-type: none"> <li>▶ performance measurement (e.g. ROE, net income, inventory control, quality)</li> <li>▶ budgeting</li> <li>▶ reward structures</li> <li>▶ report of achievements</li> </ul> | <ul style="list-style-type: none"> <li>▶ procedure guide</li> <li>▶ operating manuals</li> <li>▶ supervision of rules</li> <li>▶ physical or administrative restrictions (e.g. expenditure approvals, passwords)</li> </ul> | <ul style="list-style-type: none"> <li>▶ recruitment policies</li> <li>▶ training programmes</li> <li>▶ job design</li> <li>▶ provision of sufficient resources for the job</li> </ul> | <ul style="list-style-type: none"> <li>▶ codes of conduct</li> <li>▶ group-based rewards</li> <li>▶ interaction</li> <li>▶ manager = role model</li> </ul> |

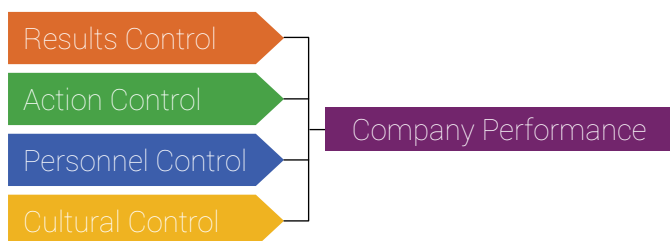
Our project aimed to add value partly by gathering and presenting descriptive data on the extent of use of individual control techniques and on the extent to which each of them contributes to companies' innovation performance as innovators. (Objective b) above).

We derived three models from the literature to structure and inform our further investigations; Model 1 addresses Objective a), while Models 2 and 3 relate to Objective c). They were analysed by means of multiple linear regression.

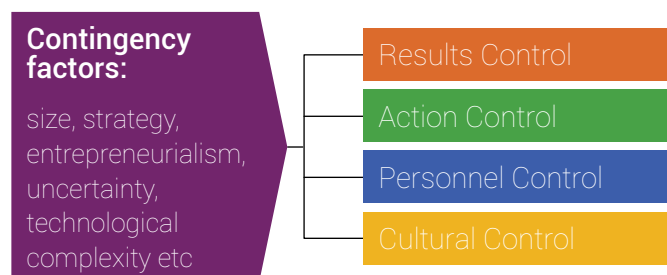
Using the Merchant and Van der Stede (2012) objects-of-control framework we reviewed the relevant literature to make a list of the individual controls that had been used in previous academic publications concerning management controls. To this list we added a number of controls that specifically related to innovative companies from the limited number of studies in this area. The questions were then tested in the pilot interviews.

Figure 1. Models of the relationships analysed.

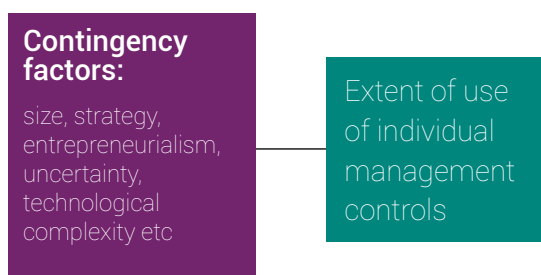
**Model 1: MCS categories and company performance Object a)**



**Model 2: Determinants of MCS categories Objective c)**



**Model 3: Determinants of individual controls Objective c)**





Initially we interviewed a sample of 15 operational, financial and HR managers in 10 innovative UK companies. These in-depth interviews of approximately 60 minutes enabled us to validate the draft questionnaire we had based on prior relevant literature. In particular we asked about: how innovative they believed their company was, and why; how, if at all, their innovation was a managed process; the controls they have in place; and whether our draft questionnaire was understandable, complete and relevant. This process significantly improved the questionnaire which was then piloted on practitioners and academics. After further revisions it was distributed to numerous companies across a wide range of industries throughout the UK.

The questionnaire included 27 questions, with varying numbers of items to be completed within each question. It took around 20 minutes to complete and addressed:

- ▶ general company characteristics such as their size, industry, ownership, life-cycle stage, competitive strategy and entrepreneurial orientation, sources and levels of uncertainty, level of technological advancement, and interaction with supply-chain partners and networks
- ▶ companies' capacity to innovate and types and degree of innovation
- ▶ the nature of their management controls in categories of Action Controls, Results Controls, Personnel Controls and Cultural Controls
- ▶ their overall corporate performance across balanced scorecard dimensions
- ▶ the extent of use and perceived effectiveness (on innovation) of 22 specified control instruments.

Data was collected from managers and management accountants via an online survey platform. Invitations to participate were distributed through networks such as Twitter, LinkedIn (CIMA and ICAEW, South West and Wales regional members), E-mail lists from CIMA, various innovation networks supported by universities and government supported bodies such as InnovateUK, LEPs and Business Growth Hubs. In addition relevant companies and managers were identified, e.g. selected from the FAME company database based on research and development spending compared to turnover over the previous five years, and 177 hard copy questionnaires were distributed through the post.

The survey was completed by 111 individuals, of which 33 questionnaires had to be excluded due to missing data, a lack of company innovativeness or companies having less than 20 employees as we considered these to be too small to have institutionalised managerial control systems.

The following selection criteria were used to identify innovation companies: current level of innovation regarding product, service, process, marketing and/or organisational innovations during the last three years, and future perceived innovation ability. The final sample included 78 companies located in the UK.

Of the 78 respondents in the final sample, around 50% were company directors, 15% operational managers and 13% of the respondents were in an accounting or 'controlling' or role. 75% of the companies in the sample had less than 1,000 employees.



# Main findings and implications for practice

**Objective a)** To shed light on the types of management control systems (MCS) that are appropriate for innovation companies. We address this objective in two ways: principally, by our summary synthesis in Section 1, of the findings of prior studies and our elaboration in Table 1; and secondly, by our empirical work described below.

The success of individual companies was measured, using a balanced scorecard approach, by managers' responses to survey questions across five dimensions: financial, customer-relations, operational, innovation and overall performance (Gong and Ferreira, 2014). The existence of these items was measured with a 7-point Likert scale ranging from 1 (well below industry average) to 7 (well above industry average).

Through other detailed questions we determined each company's reliance on the four categories of control shown in Table 1. The companies' performance scores were then regressed on their scores for each type of control which yielded the following results:

Table 2. Effects of types of controls on company success.

| Independent variables         | Dependent variable  |
|-------------------------------|---------------------|
| Management control categories | Company performance |
| <b>Results Control</b>        | 0.383*              |
| <b>Action Control</b>         | -0.306*             |
| <b>Personnel Control</b>      | -0.011              |
| <b>Cultural Control</b>       | 0.187               |

\* significant at a 95% confidence level

The two direct forms of control are found to have an impact on the success of innovative companies, but in opposite directions. While the effect of Results Control is positive, Action Control has a detrimental effect on company performance. The Results Control finding is explored in more detail under Objective b) below.

The unsuitability of Action Control, in general, for innovation companies is not surprising. In 1978 Miles and Snow recommended such controls for enterprises with standardised procedures and Bedford and Malmi 2015 state that Action Control is based on centralised authority, direct monitoring and restricted autonomy, formal planning, standardised rules and procedures and well-defined boundaries of conduct. These characteristics are not likely to foster the creativity required to innovate. This result is also consistent with Slocum and Sims (1980) who argued that only repetitive tasks should be managed by impersonal means through rules and procedures; whereas task uncertainties require a developmental mode of control based on setting wider goals and norms concerning employees' behaviours and interactions.

The non-significant path coefficients of Personnel Control and Cultural Control, as general categories, are investigated in more detail in the following section.

**Objective b)** To identify individual management controls that are applied in UK innovation companies in 2016/17 and their perceived effect on innovation performance.

Respondents were asked to indicate the 'Extent of Use' and the 'Effect on innovation performance' for each of 22 control instruments. The list of 22 was based on the controls most frequently found in our survey of the relevant academic literature. To this list we added others that specifically relate to innovative companies. All questions were then initially piloted in interviews, which led to revisions and controls being incorporated. The 22<sup>1</sup> instruments were evenly spread across the categories of Action Controls (6), Results Controls (5), Personnel Controls (5) and Cultural Controls (6) with some partly overlapping those category boundaries.

Tables 3 and 4 show mean values of the questionnaire responses for each of these instruments. Table 3 is ranked in order of Extent of use (column on right) but also shown are the mean values for Effect on innovation performance whereas Table 4 is ranked according to Effect on innovation performance.

The Extent scores were derived from the questionnaire which required the respondents to rate each control on a scale of 1 to 5 where 1 represented the company not using the control at all and 5 represented extensive use.

With regard to Effect on innovation the respondents rated each control from -2, very negative impact on performance, to +2, very positive impact on performance. We stress that this is a measure of the respondents' perception of an instrument's contribution to innovation performance. On average they perceive that all control instruments enhance innovation performance – this does not automatically mean that there is a link to company performance. The first column notes the management control categories where A = Action, R = Results, P = Personnel and C = Cultural.

<sup>1</sup> Respondents were given space to add any other control instrument they felt was relevant but missing. These were interesting but none were volunteered by more than one respondent.

Table 3. Mean values of responses on the Extent of use and on Contribution to innovation performance ranked in terms of Extent of use.

| Control instrument |   | Mean values on scale of: | Extent of Use<br>1 to 5 | Effect on innovation performance<br>-2 to +2 |
|--------------------|---|--------------------------|-------------------------|--|
| R                  | Routine analysis of financial performance against target, variances from budget and differences between actual and standard product costs * |                          | 4.00                    | 0.42   |
| A                  | Budget approval process *   |                          | 3.91                    | 0.35   |
| P                  | Job specific recruitment and selection process for new hires *  |                          | 3.88                    | 0.88   |
| C                  | Top management regularly/frequently communicate performance *   |                          | 3.81                    | 0.66   |
| A                  | Standard operating procedures *   |                          | 3.77                    | 0.38   |
| P                  | New employee orientation programme  |                          | 3.72                    | 0.64   |
| R                  | Written performance appraisals  |                          | 3.67                    | 0.56   |
| A                  | ISO standards (e.g. ISO 9000)   |                          | 3.60                    | 0.46   |
| P                  | Employee training and development programmes *  |                          | 3.59                    | 0.88   |
| A                  | Access and physical controls *  |                          | 3.58                    | 0.34   |
| C                  | Organisational arrangements to encourage multi-disciplinary interaction rather than a 'silo mentality'                                      |                          | 3.39                    | 0.54   |
| R                  | Routine analysis of non-financial measures (e.g. market share, customer satisfaction, quality rejects, task accomplishment) *               |                          | 3.37                    | 0.43   |
| A                  | Defined routines to capture, manage and protect ideas   |                          | 3.19                    | 0.39   |
| P                  | Job specifications that permit and encourage innovation   |                          | 3.04                    | 0.60   |
| C                  | A stated policy regarding innovation, or innovation guidelines contained in a wider document  |                          | 3.03                    | 0.35   |
| A                  | A stage-gate system for approving, developing and implementing innovative ideas   |                          | 2.99                    | 0.41   |
| P                  | Mentoring *   |                          | 2.96                    | 0.45   |
| C                  | Social events and outings   |                          | 2.89                    | 0.53   |
| C                  | Group-based rewards, e.g. bonuses or profit-sharing based on overall company or team performance *  |                          | 2.83                    | 0.38   |
| C                  | Physical office arrangements such as office plans, architecture and interior décor *  |                          | 2.81                    | 0.34   |
| R                  | Pay-for-performance, or other employee rewards for good results *   |                          | 2.74                    | 0.32   |
| R                  | Monitoring and reporting the number of new product/service launches or cost efficiencies due to process innovations                         |                          | 2.73                    | 0.36   |

A = Action Control, R = Results Control, P = Personnel Control, C = Cultural Control

\* Controls discussed by Merchant and Van der Stede. See Paragraph 3.4 for explanation of derivation of the other controls.

Table 4. Mean values of responses on the Extent of use and on Contribution to innovation performance ranked in terms of Contribution to innovation performance.

| Control instrument |   | Mean values on scale of: | Extent of Use<br>1 to 5 | Effect on innovation performance<br>-2 to +2 |
|--------------------|---|--------------------------|-------------------------|--|
| P                  | Job specific recruitment and selection process for new hires *  |                          | 3.88                    | 0.88   |
| P                  | Employee training and development programmes *  |                          | 3.59                    | 0.88   |
| C                  | Top management regularly/frequently communicate performance *   |                          | 3.81                    | 0.66   |
| P                  | New employee orientation programme  |                          | 3.72                    | 0.64   |
| P                  | Job specifications that permit and encourage innovation   |                          | 3.04                    | 0.60   |
| R                  | Written performance appraisals  |                          | 3.67                    | 0.56   |
| C                  | Organisational arrangements to encourage multi-disciplinary interaction rather than a 'silo mentality'                                      |                          | 3.39                    | 0.54   |
| C                  | Social events and outings   |                          | 2.89                    | 0.53   |
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| R                  | Routine analysis of financial performance against target, variances from budget and differences between actual and standard product costs * |                          | 4.00                    | 0.42   |
| A                  | A stage-gate system for approving, developing and implementing innovative ideas   |                          | 2.99                    | 0.41   |
| A                  | Defined routines to capture, manage and protect ideas   |                          | 3.19                    | 0.39   |
| A                  | Standard operating procedures *   |                          | 3.77                    | 0.38   |
| C                  | Group-based rewards, e.g. bonuses or profit-sharing based on overall company or team performance *  |                          | 2.83                    | 0.38   |
| R                  | Monitoring and reporting the number of new product/service launches or cost efficiencies due to process innovations                         |                          | 2.73                    | 0.36   |
| A                  | Budget approval process *   |                          | 3.91                    | 0.35   |
| C                  | A stated policy regarding innovation, or innovation guidelines contained in a wider document  |                          | 3.03                    | 0.35   |
| A                  | Access and physical controls *  |                          | 3.58                    | 0.34   |
| C                  | Physical office arrangements such as office plans, architecture and interior décor *  |                          | 2.81                    | 0.34   |
| R                  | Pay-for-performance, or other employee rewards for good results *   |                          | 2.75                    | 0.32   |

These findings lead to the following interesting observations:

Of the top 5 control instruments ranked in terms of contribution to innovation performance, 4 of them are Personnel Control instruments and 1 is a Cultural Control instrument. None of the 5 are Action Controls or Results Controls. See Table 4.

Five instruments rank highly in contributing to innovation performance but are not used as intensively as other controls that contribute less to performance:

- ▶ Job specifications that permit and encourage innovation
- ▶ Employee training and development programmes
- ▶ Organisational arrangements to encourage multi-disciplinary interaction rather than a 'silo mentality'
- ▶ Mentoring, and
- ▶ Social events and outings.

**Managers looking to implement management controls to improve innovation performance may wish to consider some of the above controls.**

Routine analysis of financial performance against target and of variances from budget and differences between actual and standard costs of products, and Budget approval process are both very frequently used (ranked 1st and 2nd out of 22) but are only ranked 12th and 18th respectively in terms of promoting innovation.

Four instruments rate highly for both intensive use and contribution to innovation performance:

- ▶ Job specific recruitment and selection process for new hires
- ▶ Top management regularly/frequently communicate performance
- ▶ New employee orientation programme, and
- ▶ Written performance appraisals.

Four instruments are very low in terms of both use and promoting innovation performance:

- ▶ Pay for performance, or other employee rewards for good results
- ▶ Group-based rewards, e.g. bonuses or profit-sharing based on overall company or team performance
- ▶ Physical office arrangements such as office plans, architecture and interior décor, and
- ▶ Monitoring and reporting the number of new product/service launches or cost efficiencies due to process innovations.

Various practical implications are suggested by the observations above. The current practices of UK innovation companies, and the perceptions of their managers, endorse the view that companies seeking successful innovation should emphasise and invest in indirect controls – in particular Personnel Controls. Illustrative comments in the initial interviews include: "It's all about having the right people in the right place"; "We promote from within. A lot of people work their way up. It's about empowering people"; "We deliberately always advertise all vacant positions internally before advertising them externally. This is good for labour relations and also for encouraging employees to move around the company."

**The very widely applied Results Control instruments are shown to contribute surprisingly little to success in innovation.**

In particular Routine analysis of financial performance against targets, and the Budget approval process should not be solely relied upon to support innovation. Since Results Controls contribute positively to overall performance their use is justified in other areas of a business but companies with innovation central to their business model should consider de-emphasising them in the departments most responsible for innovating. This conclusion is supported by a separate, more detailed, analysis showing that 18% (2nd worst of 22) of responses to the Budget approval question and 17% (5th worst) of responses to the Analysis of financial performance question stated these instruments actively have a 'very negative' or 'negative' effect on performance as innovators. However, we must be aware that the way that controls are used in an organisation will affect whether their impact is beneficial or detrimental to innovation performance. For instance as Summers (2005) illustrates, for a pay for performance system to be effective it must be combined with accurate assessments of individual employee performance from a suitably implemented performance management system.

**Furthermore, the increasingly prescribed practice of reinforcing Results Controls by use of Pay for performance and Profit-sharing are found to be not much used and less effective in promoting innovativeness compared to instruments in other control categories in this population of innovation companies.**

This may be explained by the substantial body of experimental and field research in psychology which provides evidence that, in tasks requiring exploration and creativity, Pay for performance can actually undermine performance (Ederer and Manso, 2013). Also, Shipton et al (2006) found, in general, "no direct relationship between contingent reward and either type (exploration or exploitation) of innovation" (p.19). The views of our respondents concur with public sector evidence collected in Marsden and Richardson (1994, p.252) that performance pay did not lead to sustained high performance; as illustrated by one interviewee: "Commercial reward is useful but it only lasts a month or two." However, in their experiment Ederer and Manso found that subjects under a payment scheme that tolerates early failure and rewards long-term success, explore more and are thus more likely to discover superior strategies than subjects under fixed-wage or standard Pay for performance incentive schemes.

**Objective c) To show factors that influence the four types of management controls, and specific tools, applied in innovation companies.**

We collected data on the characteristics of innovation companies and their environments (see Research Methodology, Para 3.6). By applying linear multiple regression analyses, we identify which of these (independent) variables influences the four control categories (Results, Action, Personnel and Cultural), and the 22 individual control techniques (Tables 3 and 4).

We found that:

**Innovation companies pursuing cost leadership in their industry seem to rely significantly on Action Control.**

These companies are innovative by virtue of their high levels of process innovations. By testing the impact of the different types of innovation (process, products and services, new channels and business models, marketing and organisation) on each of the control categories, the only significant path was from process innovation to the Action Control category. We find that Action Control is not useful for companies whose focus is on innovative design, new products etc. These "differentiator companies" aim to offer

unique products with an emphasis on marketing and research and hence on product innovation; whereas cost leaders emphasise standardised products at low prices while reducing production costs, for example with process innovations. Action Control is required by cost leaders in order to create standard procedures, continuously improve existing procedures and reduce non-value added activities. Whereas for differentiators, excessive Action Control may lead to an over-emphasised focus on the realisation of prescribed actions instead of experimentation and a flexible response to customer satisfaction. This finding highlights the problem with the breadth of scope of the term 'innovation company' which may have implications for generic public sector policies seeking to promote innovation.

**The overall ability of a company to innovate is very significantly associated with both types of indirect control - Personnel and Cultural but not direct controls.**

One of the managers that we interviewed stressed that "It's all about the people." Another stated that "People are critical."

Wilkins and Ouchi (1983) stressed the relevance of Cultural Control for controlling situations of high ambiguity and difficulty, such as where there is high technological uncertainty; also Alvesson (1993) and Kunda (2006) suggested that Cultural Control is appropriate for balancing autonomy and control in knowledge-intensive firms. However, as shown in Table 5, we find a negative relationship between technology and the use of group-based rewards which is a Cultural Control instrument. Companies scoring highly for technical novelty and technical difficulty also make less use of Pay for performance incentivisation schemes. Probably these companies place less reliance on employee effort, because they can rely on a high degree of automation.

For a more detailed analysis, each of the 22 control instruments was regressed on nine company characteristics. Table 5 shows values for the company characteristics (in columns) that are significant determinants of the use individual control instruments. From the initial 22 control instruments tested, 10 remain in the table.

Table 5. Associations between company characteristics and the use of individual control instruments

| Dependent variables:<br>Individual Management Controls | Independent variables: Company characteristics |            |                          |                               |                             |             |                     |                           |             |
|--|--|------------|--------------------------|-------------------------------|-----------------------------|-------------|---------------------|---------------------------|-------------|
|  | Size   | Technology | Cost leadership strategy | Different leadership strategy | Entrepreneurial orientation | Uncertainty | Ability to innovate | Investments in innovation | Cooperation |
| Budget approval process                                |  |            | 0.128**                  |                               |                             |             |                     |                           | 0.161*      |
| Defined routines to capture, manage and protect ideas  |  |            |                          |                               |                             |             |                     |                           | 0.432*      |
| Stage-gate system                                      |  |            |                          |                               |                             |             |                     |                           | 0.335*      |
| Pay for performance                                    |  | -0.367*    |                          |                               | 0.438*                      |             | 0.453*              |                           |             |
| New employee orientation programme                     |  |            | 0.328*                   | 0.467**                       |                             |             | 0.340*              |                           |             |
| Employee training and development programmes           |  |            | 0.305*                   | 0.354**                       |                             |             | 0.128**             | 0.128**                   |             |
| Innovation-related job specifications                  |  |            | 0.254*                   |                               |                             |             |                     |                           | 0.497**     |
| Physical office arrangements                           |  |            |                          | -0.414*                       | 0.401*                      |             |                     |                           |             |
| Group-based rewards                                    |  | -0.335*    | 0.338*                   |                               |                             |             | 0.358*              |                           |             |
| A stated innovation policy                             |  |            | 0.375*                   |                               |                             |             |                     |                           |             |

\* significant at a confidence level of 95%, \*\* significant at a confidence level of 99%



The following observations can be made:

Company size and uncertainty do not influence the choice of control instruments.

As regards to technology (in terms of novelty and difficulty of the technology), the previously noted negative association with the Cultural Control category is further explained by the negative impact of technology on group-based rewards which is a Cultural Control instrument. Also, the companies scoring highly for technical novelty and technical difficulty make less use of Pay for performance incentivisation schemes.

Companies pursuing a cost leadership strategy strongly rely on budgets, but also on Personnel and Cultural Controls. For these companies, human resources seems to be a key in realising their strategy.

Differentiator-type companies rely less on building cohesive cultures by arrangements such as office plans, architecture and interior décor but are explicit about their innovation 'mission'; furthermore they apply employee orientation and development controls even more than the cost leaders.

In contrast, companies with a high entrepreneurial orientation place relevance on Physical office arrangements and on Pay for performance.

Companies that score highly on our measure of innovation ability are also likely to adopt four control instruments all with a focus on personnel and teamwork.

To summarise Objective c), the use of four individual control instruments are shown to have significant associations (in terms of usage) with various characteristics of innovation companies: New employee orientation programme, Pay for performance, Employee training and development programmes, and Group-based rewards. However, of great practical relevance is that the latter two controls have negative usage associations respectively with companies that have invested heavily in innovation and companies scoring highly for technical novelty and technical difficulty. The broader point here is the lack of homogeneity in the umbrella term 'innovation companies'; for instance, controls that support innovation in companies with a high degree of technical difficulty may not suit those that pursue a cost leadership strategy.

# Conclusions

Despite some claims to the contrary, we find conclusively that management control systems are potentially of great value to innovation companies. However their design has to be carefully considered and adjusted to fit the circumstances of each enterprise. For instance, there is a lack of homogeneity in the umbrella term 'innovation companies' and controls that support innovation in companies with a high degree of technical difficulty may not be suitable in those pursuing a cost leadership strategy.

The use and performance effects of management controls are important issues for managers of innovation companies in guiding the behaviour and enabling the creativity of their workforce. They are also highly relevant topics for regional and national policy makers as they are able to encourage and support companies' use of selected control instruments.

This study showed that indirect controls – those elements from the Personnel and Cultural Control categories are particularly effective in innovation companies. Action Controls, presumably constraining employee behaviour are only of general importance for companies with a cost leadership strategy.

Taken as a whole across our entire sample, the use of Action Controls, as currently practised, has a negative effect on company success as measured by the balanced scorecard. As concluded by Shipton et al (2006, p.21 - 24) "People are central to innovation performance ... relatively high levels of innovation can be achieved where people are empowered to make changes (but) ... where people feel controlled by another party they will be unlikely to look for new and creative solutions."

Interestingly, while Results Controls are intensively used in innovation companies and their overall impact on company performance seems to be positive, there is evidence that individual controls may have negative effects on enterprises' performance as innovators. However, whether or not a control instrument is beneficial or detrimental to innovation performance will be fundamentally affected by the way that it is used in any organisation.

This report needs to be interpreted within the constraints of its limitations, e.g. the sample size, the questionnaire data collection method and a potential self-selection of respondents. However, care was used when setting up the theoretical framework and questionnaire by a comprehensive set of interviews and survey piloting. Further analysis with more advanced statistical tools and larger data sets would be valuable.

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# Further reading

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